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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,751	11/26/2003	Akihiko Shiina	K06-163744M/TBS	3940

21254 7590 04/28/2006

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EXAMINER
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LUM VANNUCCI, LEE SIN YEE

ART UNIT	PAPER NUMBER
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3611

DATE MAILED: 04/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/721,751

Applicant(s)

SHIINA ET AL.

Examiner

Lee Lum

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 2/21/06.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10, 12-18 and 20-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) all is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

1. An Amendment was filed 2/21/06.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A. **Claims 1, 3-10, 12-15, 17, 18, 20-31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizukoshi.

Re **Claims 1, 3, 12, 20-22**, Mizukoshi discloses an electric power steering apparatus (fig 6) comprising

Driving gear/worm 5, and driven gear/worm wheel 2, the two offset with respect to each other (inherent),

Steering neutral position (inherent), and,

Wherein the driven gear includes a bias portion (figs 3-5), formed by biasing a part of an outer periphery of teeth, in a direction in which a first backlash is decreased, with respect to a second backlash (c3, ln 27-28; "an appropriate backlash can be maintained").

The reference does not specify a first backlash in a first range of steering angles, this backlash being less than a second backlash in a second range of steering angles, but this feature is application-specific, and would have been obvious to one skilled in the art. This feature is within an expected range of steering capabilities, dependent on the particular application.

Re **Claims 4-7, 17, 18, 26-28**, Mizukoshi discloses the elements as provided above, but does not disclose “first/second ranges of steering ranges on each side of neutral”, and specificity about these terms/factors. However, these features are clearly application-dependent, and would have been obvious to one skilled in the art. Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, to provide a scope of the invention (although nonlimiting), thus increasing applicability.

Re **Claims 8-10, 13-15, 23-25, 29 and 31**, the reference discloses mathematical terms such as “gearing angle” (i.e., “gear ratio G”), “pressure angle”, and “pitch circle diameter”, but does not disclose the equation  $\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha))$ . However, the calculations in (at least) c1, ln 67, to c2, ln 26, are functionally equivalent. It would have been obvious to one with ordinary skill to include mathematical calculations to provide the scope of the invention, thus increase applicability.

Additionally, specificity as to these terms (e.g., “the pitch circle diameter ranges from...” is also application-dependent, and would have been obvious to one skilled in the art.

**B. Claim 32** is rejected under 35 U.S.C. 103(a) as being unpatentable over Mizukoshi in view of Kojo et al 6041887.

Mizukoshi discloses the elements as provided above, but do not disclose a motor with variable power assist.

Kojo shows motor 24 as controlled to output variable power assist, according to the range of operation (i.e., of the steering wheel), as provided in c5, ln 24-34, ln 52-56, c6, ln 53-63, etc). It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Kojo, to provide improved steering handling, thus increase driver comfort.

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4. The prior art considered pertinent, but not relied upon, includes:

Takahashi et al 3810395, Stanger et al 3710640.

5. RESPONSE TO REMARKS

Examiner provides new art rejections employing Mizukoshi as the primary reference. The amendments to the independent claims have resolved previous clarity/structural issues. However, the language "biasing a part of an outer periphery of teeth in a direction in which...backlash is decreased" is broad. Mizukoshi clearly obviates this limitation by disclosing the shaping of the "outer periphery of teeth" towards the "adjustment of backlash".

Additionally, as provided above, any specificity about factors regarding desired steering capability/operation, such as "gearing radius", "first/second steering angles", etc, are application-specific, and desired ranges/values would have been obvious to one skilled in the art.

Examiner apologizes for the inconvenience.

6. Communication with USPTO/Examiner

Any inquiry concerning this communication, or others, should be directed to Ms. Lum at 571 272-6649, M-F, 9-5. If attempts to reach the examiner are unsuccessful, her supervisor, Ms. Lesley Morris is at 571 272-6651. Our fax number is 571 273 8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications: private PAIR only, for published applications: private or public PAIR. For more information re PAIR: <http://pair-direct.uspto.gov>. Questions re access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866 217-9197 (toll-free).

Ms. Lee S. Lum-Vannucci  
Examiner  
4/27/06

